TESTIMONY OF

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SOLAR ENERGY INDUSTRIES ASSOCIATION

SUBMITTED TO THE

U.S. HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATION AND OVERSIGHT &
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

JOINT HEARING ON

IMPACT OF TAX POLICIES ON COMMERCIAL APPLICATION OF RENEWABLE ENERGY TECHNOLOGY

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SEIA Solar Energy Industries Association®

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Chairman Broun, Chairman Harris, Ranking Member Tonko, Ranking Member Miller and members of the subcommittees:

The Solar Energy Industries Association (SEIA) is the national trade association for the U.S. solar energy industry. On behalf of our 1,100 member companies and the more than 100,000 American taxpayers employed by the solar industry, I appreciate having the opportunity to testify this morning about the important and constructive role that federal tax incentives have played in helping expand the deployment and use of renewable energy.

Introduction

Access to a diverse, abundant, reliable and affordable supply of energy is in the national interest. Accordingly, federal policy has for decades provided a legislative and regulatory framework that has helped every major source of energy utilized in the U.S. today reach commercial scale. The recognition that smart policy can play a vital role in developing new domestic energy resources has contributed significantly to America's long-term economic prosperity and growth.

Similarly, history has shown that well-crafted and efficient federal tax incentives can be powerful policy mechanisms to promote the nation's energy objectives and leverage private sector investment for the deployment and utilization of new energy resources. This is clearly the case with federal tax incentives designed to promote the expanded deployment and use of solar energy technologies.

Since the enactment of the 30 percent commercial and residential solar Investment Tax Credit ("ITC") in 2005 and the 1603 Treasury Program ("1603") in 2009, domestic deployment of solar has increased seven-fold; the cost to consumers has significantly dropped; and we have developed a domestic industry value chain that today employs over 100,000 Americans. By any objective measure, these important incentives are doing exactly what they were meant to do – allow our nation to reap the significant energy, economic and environmental benefits associated with utilizing our abundant solar resources.

When compared to other sources of energy – both conventional and renewable – the duration of federal support for solar has been brief. The solar ITC is the primary federal policy that encourages the deployment of solar technology. Since the ITC took effect in 2006, the industry has made significant and concrete strides towards grid parity. If current trends continue and costs continue to drop on account of economies of scale, improved technology and enhanced efficiencies, the solar industry's need for federal policy support will be shorter than virtually any other domestic energy source.

Ultimately, it is the entrepreneurs in America's solar industry – from the scientists that are developing more efficient and cost-effective solar technologies to the market innovators that are providing new financing options that make solar more affordable for consumers – that are responsible for the rapid growth and reduced costs that are the hallmarks of America's solar industry. Stable, reliable and well-structured tax policy provides the framework that allows for this market-driven innovation. If policymakers have the foresight to retain these highly effective tax policies, this short-term investment will yield significant long-term benefits.

Background on Solar Energy Technologies

A variety of commercial solar technologies are in use in the domestic marketplace today. Solar is being deployed in a variety of market applications to respond to diverse consumer needs. Utility-scale power plants are constructed to provide traditional wholesale electricity to utilities, but projects can also be developed on a distributed basis to optimize geographic proximity to areas of high demand and avoid the costs of building new transmission lines. Moreover, many companies focus exclusively on developing solar systems on rooftops of commercial buildings and homes to allow end-use customers to reduce their monthly electricity bills. The solar industry is experiencing record growth in large part due to the flexibility and diversity of these technologies and market innovations.

Photovoltaic ("PV") Solar Technology

PV technologies directly convert energy from sunlight into electricity. Sunlight strikes semiconductor material in a panel and releases electrons from their atomic bonds, producing an electric current. PV panels contain no moving parts and generally last twenty years or more with minimal maintenance. PV panels are utilized in residential, commercial and utility-scale applications.

Traditionally, PV cells are made using various forms of silicon ("Si"), but companies are now manufacturing cells using a wide variety of semiconductor materials, each of which lend themselves to different applications. Two of these qualities are particularly important: the *absorption coefficient* – which refers to how easily light is absorbed by the material, and the *band-gap* – which determines how efficiently light energy from different parts of the solar spectrum release the electrons from their atomic bonds.

Crystalline Silicon ("c-Si") cells were first commercialized by Bell Labs in the 1950s, and are traditionally manufactured by slicing high-grade (>99.99 percent pure) silicon into thin wafers, roughly as thick as several human hairs. Mono-crystalline silicon solar cells offer higher efficiencies but are more difficult to manufacture. Poly-crystalline silicon cells have generally lower efficiencies but are cheaper and easier to manufacture.

Thin-film solar cells are manufactured by applying very thin layers of semiconductor material to inexpensive materials such as glass, plastic or metal. Thin-film cells require less semiconductor material but tend to be less efficient at energy conversion. They also tend to be less costly to manufacture. Examples include cadmium telluride ("CdTe"), amorphous silicon (a-Si) and copper-indium-gallium-diselenide ("CIGS").

Multi-junction cells, which are also referred to as cascade or tandem cells, are the highest-efficiency solar cells currently available. These cells work by combining two or more types of semiconductor material with staggered band-gaps, allowing each to capture a different range of the solar spectrum. The result is a cell with much higher efficiency than any single-material PV cell. These types of cells are expensive to manufacture, and are used when weight and efficiency are at a premium, such as satellites, high-performance solar-powered vehicles, in military applications, and for Concentrating PV ("CPV").

CPV technology utilizes a specialized type of solar panel which uses mirrors or lenses to focus high concentrations of direct sunlight onto high-efficiency solar cells. Since concentrating panels cannot absorb diffuse light, they are typically only used in areas with high levels of direct sunlight such as the U.S. Southwest. In order to maintain focus, CPV employs tracking systems allowing them to follow the sun's path as it moves across the sky. Tracking systems can also be used in projects utilizing standard non-concentrating PV panels to increase energy harvest by more than 20 percent.

Concentrating Solar Power ("CSP") Technology

CSP plants use mirrors or lenses to concentrate the thermal energy from the sun, creating temperatures high enough to drive traditional steam turbines or engines that create electricity. This technology is optimal for utility-scale applications and is ideal for areas of high direct normal solar radiation, such as the U.S. Southwest.

There are a variety of CSP technologies utilized in the marketplace. Parabolic trough systems use curved mirrors to focus the sun's energy onto a receiver tube that runs down the center of a curved-mirror trough. In the receiver tube, a high-temperature heat transfer fluid (e.g., synthetic oil) absorbs the sun's energy, reaching temperatures of around 700° F, and passes through a heat exchanger to heat water and produce steam. The steam drives a conventional steam turbine power system to generate electricity. A typical solar collector field contains hundreds of parallel rows of troughs connected as a series of loops, which are placed on a north-south axis so the troughs can track the sun from east to west. Individual collector modules are typically 15-20 feet tall and 300-450 feet long.

Power tower projects utilize a central receiver system. Seeking higher operating temperatures for greater efficiencies, computer-controlled flat mirrors (heliostats) track the sun along two axes and focus solar energy on a receiver at the top of a high tower. The focused energy is used to heat transfer fluid (800° F to 1,000° F) to produce steam and run a central power generator.

Another CSP technology utilizes compact linear Fresnel reflectors (CLFR). To reduce some of the up-front capital costs of plant construction, CLFR developers rely on the principles of curved-mirror trough systems, but use long parallel rows of lower-cost flat mirrors. These modular reflectors focus the sun's energy onto elevated receivers, which consist of a system of tubes through which water flows. The concentrated sunlight boils the water, generating high-pressure steam for direct use in power generation and industrial steam applications.

The technical process of capturing thermal energy for CSP power plants has led some companies to develop energy storage capabilities to smooth facility output throughout the day and even generate electricity after the sun is no longer shining.

The method of thermal storage in CSP plants involves capturing the heat of solar radiation in a heat transfer medium very similar to a thermos that can keep coffee hot for hours. Some plants currently under construction include a storage process utilizing molten salt, a combination of sodium nitrate and potassium nitrate that is often found in food preservatives and fertilizers. The mixture can be heated to a lava-like consistency and pumped into a holding tank. In this state, it will lose only about 1 percent of its heat during the day. The molten salt can be removed from the tank at any time, even during evening hours, to be run through a heat exchanger to create steam, run a turbine, and generate electricity for the power grid. The used salt is returned to a second tank at a lower temperature to be passed through the cycle again in a continuous loop.

Solar Heating and Cooling Technology

Solar heating and cooling technologies collect the thermal energy from the sun and use this heat to provide hot water, space heating, cooling and pool heating for residential, commercial and industrial applications.

Solar water heating systems can be installed on any home and are composed of three main elements: the solar collector, insulated piping, and a hot water storage tank. The solar collector gathers the heat from solar radiation and transfers the heat to potable water. This heated water flows out of the collector to a hot water tank, and is used as necessary. Auxiliary heating can remain connected to the hot water tank for back-up if necessary.

There are two kinds of solar cooling systems: desiccant systems and absorption chiller systems. Absorption chiller systems, the most common solar cooling systems, use solar water heating collectors and a thermal-chemical absorption process to produce air-conditioning, without using electricity. The process is nearly identical to that of a refrigerator, only no compressor is used. Instead, the absorption cycle is driven by a heated fluid from the solar collector. In a desiccant system, air passes over a common desiccant or “drying material” such as silica gel to draw moisture from the air and make the air more comfortable. The desiccant is regenerated by using solar heat to dry it out.

Solar space heating systems are similar to solar water heating systems, but generally involve more solar collectors, larger storage units, and a more sophisticated design. These heating systems can use a non-toxic liquid, water, or air as the heat-transfer medium from the solar collector. The heated liquid or air is then circulated throughout the building or home to provide space heating. Another solar space heating technology uses transpired solar collectors along a building’s exterior south-facing wall. The perforations in these collectors allow air to pass through and be heated. This solar-heated air is then channeled into the building's ventilation system.

Solar energy is also used to heat both commercial and residential swimming pools. The existing pool filtration system can frequently be used to transfer heat from the solar collectors to the pool water. Solar pool heating systems use different collectors, depending on the climate and on whether the pool is located outdoors or indoors.

Background on the Solar Investment Tax Credit

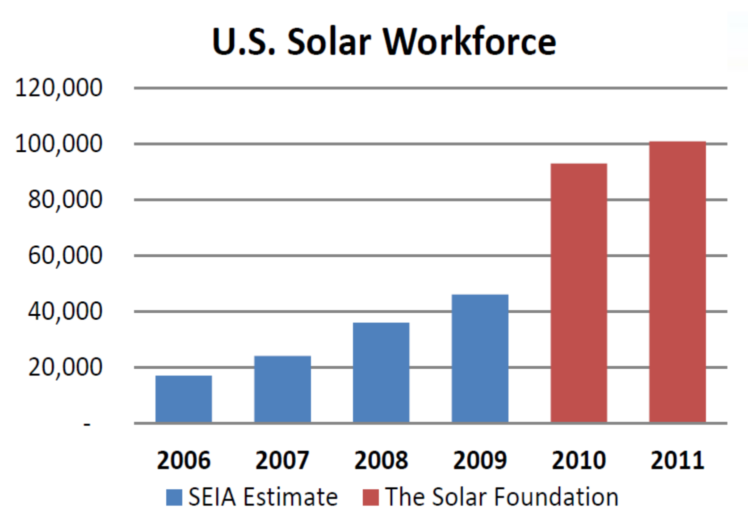
The *Energy Policy Act of 2005* (P.L. 109-58) created tax incentives for solar energy – a 30 percent ITC for commercial and residential solar energy systems that applied from January 1, 2006, through December 31, 2007. These credits were extended for one additional year in December 2006 by the *Tax Relief and Health Care Act of 2006* (P.L. 109-432). In 2007, global investment in clean energy topped $100 billion, with solar energy as the leading clean energy technology for venture capital and private equity investment. The solar ITC helped to create unprecedented growth in the U.S. solar industry from 2006-2007. The amount of solar electric capacity installed in 2007 was double that installed in 2006.

The *Emergency Economic Stabilization Act of 2008* (P.L. 110-343) included an eight-year extension of the commercial and residential solar ITC, eliminated the monetary cap for residential solar electric installations, and permitted utilities and alternative minimum tax (AMT) filers to utilize the credits. Under current law, the solar ITC is set to expire on December 31, 2016.

Solar Investment Tax Credit a Resounding Policy Success

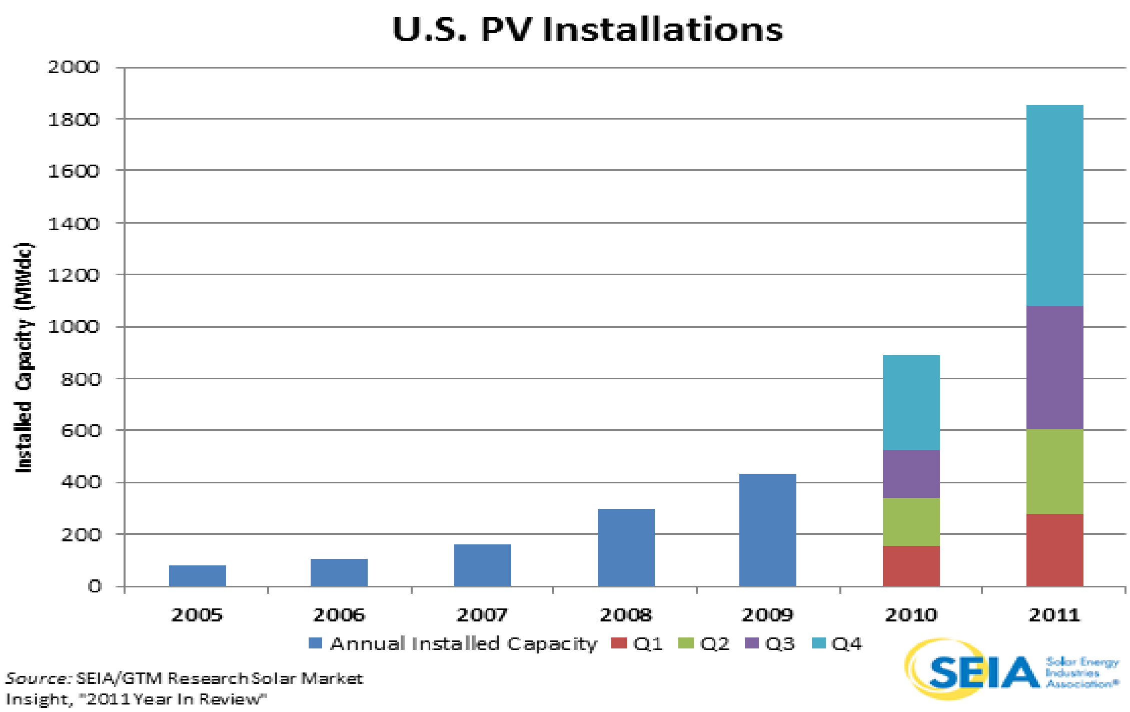
An Engine for U.S. Job Creation

Due in large part to the availability of the multi-year ITC, the solar industry grew by 109% in 2011 compared to the previous year, making it one of the fastest growing industry sectors in the U.S. economy. Today, the solar industry employs more than 100,000 Americans, more than double the number in 2009. They work at more than 5,600 companies, the vast majority being small businesses, in all 50 states. Additional job growth is expected as the industry continues to grow in the future.



Increasing U.S. Solar Installations

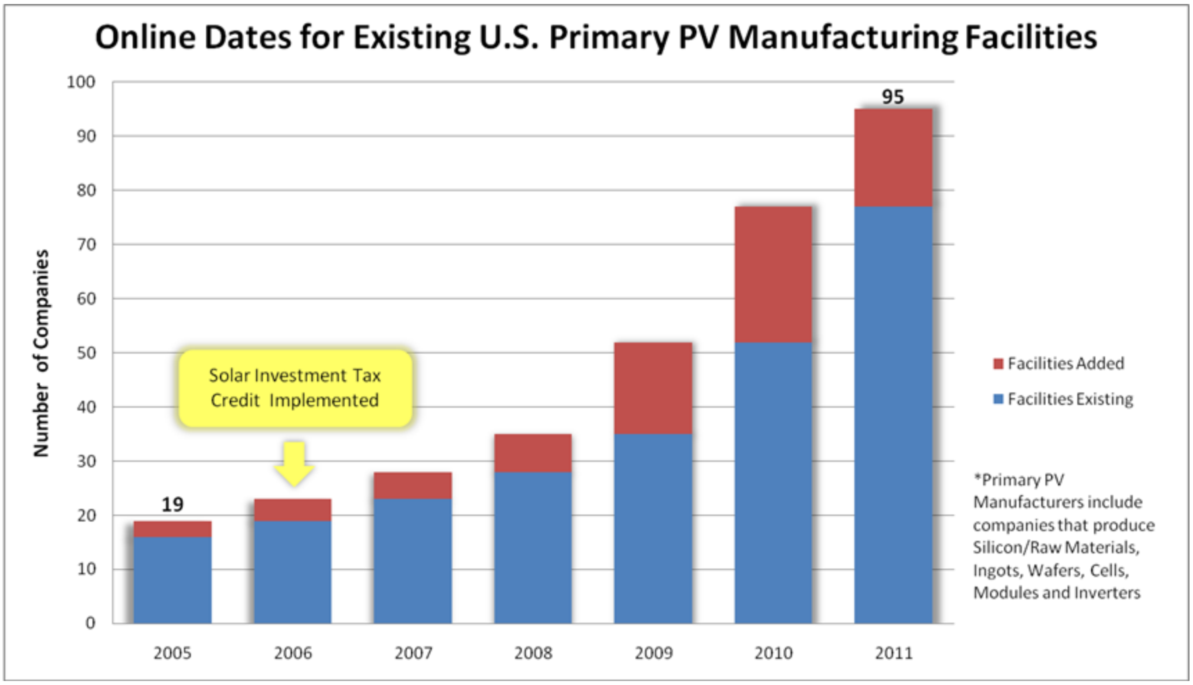
The market certainty provided by a multiple-year extension of the solar ITC has accelerated the deployment of solar in the U.S. Since the solar ITC was implemented in 2006, the total amount of solar generating capacity deployed has grown more than seven-fold. During this same time period, PV capacity has grown by nearly seventeen-fold. Cumulative solar capacity in the U.S. now exceeds 4,460 megawatts ("MW"), enough to power more than 700,000 homes. In 2011, the U.S. installed 1,855 MW of PV capacity, up from 887 MW in 2010.



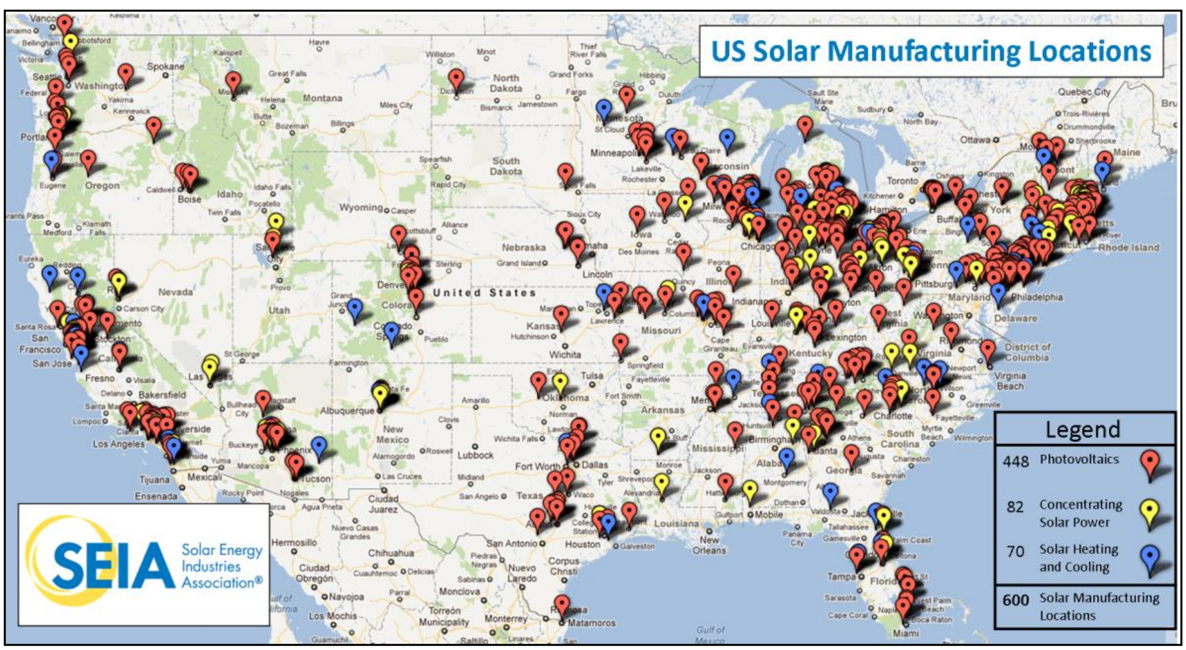
Growing U.S. Solar Manufacturing Capacity

The sharp growth in project installations after passage of the ITC occurred in tandem with expanding U.S. solar manufacturing. As annual installed generating capacity grew each year, U.S. PV panel production increased from 134 MW in 2005 to 865 MW in 2011.

Today, there are at least 95 domestic facilities in 26 states currently manufacturing PV primary components, including solar-grade polysilicon, ingots, wafers, cells, solar modules, and inverters. But only 19 of those facilities were operating in 2005 – a five-fold increase in the United States in the last six years.



Glass and steel manufacturers are also important members of the solar value chain, providing essential components for utility-scale solar power plants, including CSP projects currently under construction in the U.S. Southwest. Overall, there are 600 domestic manufacturing facilities in the solar value chain.



Without question, solar energy is a competitive, global industry. U.S. manufacturers exported to Europe and other foreign markets in the past and increasingly serve U.S. developers in response to the ITC jump-starting project construction here at home.

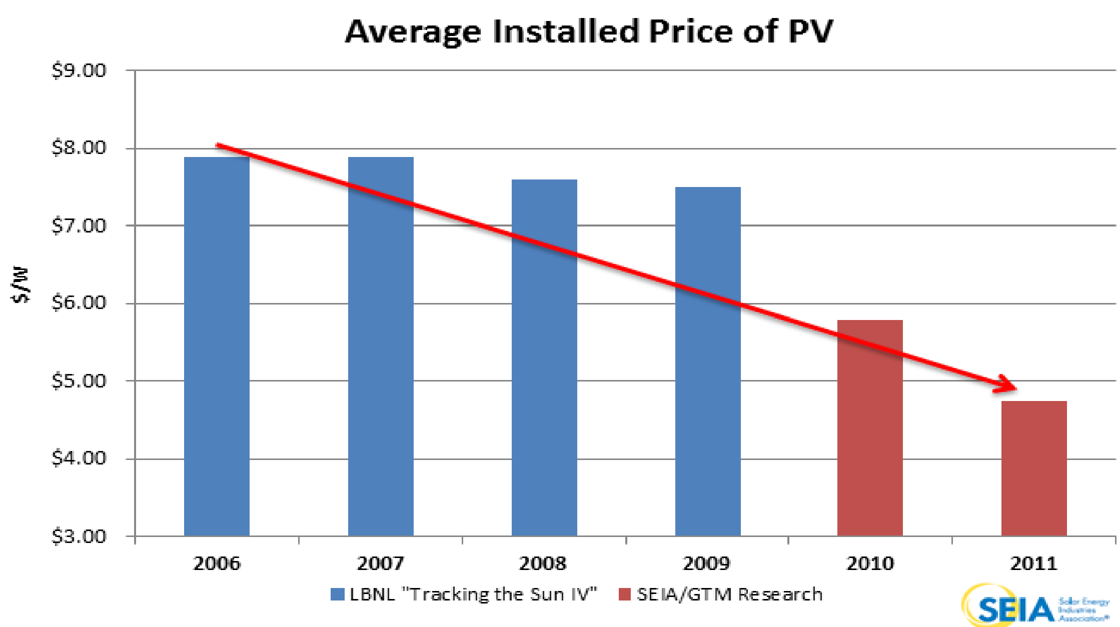
The ITC thus has a positive ripple effect that reaches beyond project development to enable growth and maturation of the broader solar supply chain. New solar manufacturing facilities opened in 2011 in Arizona, Illinois, Kentucky, Michigan, Mississippi, North Carolina, Nevada, New York, Ohio, Pennsylvania, Texas, Vermont, Washington and Wisconsin. Solar manufacturing expansion will continue in 2012 and 2013, as major new facilities come online in Arizona, Colorado, Indiana, Massachusetts, Mississippi, North Carolina, Nevada, New York, Ohio, Oregon, Pennsylvania, South Carolina and Tennessee.

As U.S. manufacturers compete with companies around the globe, the ITC is a critical policy mechanism to ensure robust demand for solar energy components in the U.S. market.

The Falling Cost of Solar for Consumers

The existence of the ITC through 2016 provides market certainty for companies to develop long-term investments in manufacturing capacity that drives competition, technological innovation, and ultimately lowers costs for consumers.

In 2011 alone, the price of solar panels dropped by 50%, and costs continue to fall, making solar even more affordable for residential and business consumers. In addition, innovative financing options for consumers, such as third-party leases and power purchase agreements ("PPAs"), have removed financial barriers and made it easier for consumers to choose solar. This is part of an ongoing trend that has shown consistent declines in solar pricing in the marketplace.

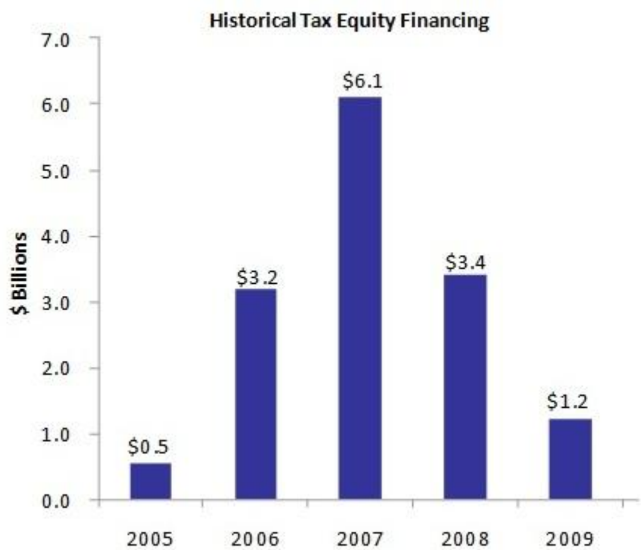


Importance of Tax Equity Financing and Credit Liquidity

The 2008 economic crisis rendered solar and other renewable energy tax incentives of little immediate value. Prior to the financial crisis, many utility-scale renewable energy projects relied upon third-party tax equity investors to monetize the value of federal renewable energy incentives. The economic downturn drastically reduced the availability of tax equity, severely limiting the financing available for renewable energy projects.

Tax equity is the term used to describe the passive financing of an asset or project by large tax-paying entities that can utilize tax incentives to offset their tax liabilities. Tax equity investors in renewable energy projects receive a return on investment based not only on the income from the asset or project, but also on federal income tax preferences (through the utilization of tax credits). Renewable energy developers themselves typically do not have sufficient taxable income to benefit directly from these tax credits and must partner with tax equity investors in order to finance projects. For example, they participate in a partnership structure in which ownership of the project is transferred from the tax equity investor to the developer-owner once the tax benefits are realized. Leasing structures akin to those commonly found in many sectors of the economy are also utilized.

The pool of tax equity investors is typically limited to the largest and most sophisticated financial firms and utilities, and the 2008 economic crisis significantly reduced the market demand among these entities for tax equity. A report released by the Bipartisan Policy Center on March 22, 2011, noted that the number of tax equity investors in renewable energy projects declined from approximately 20 in 2007 to 13 in 2008 and only 11 in 2009. The associated decline in overall tax equity financing provided to renewable energy projects was equally dramatic, falling from $6.1 billion in 2007 to $3.4 billion in 2008 and $1.2 billion in 2009.



Sources: U.S. Department of The Treasury, US Partnership for Renewable Energy Finance, and Leading Tax Equity Market Participants

Section 1603 Treasury Program

The Section 1603 Treasury Program ("1603") was enacted in 2009 and extended in 2010 to address the lack of tax equity available to finance renewable energy projects. The program lapsed at the end of 2011, though solar projects that commenced construction before the end of last year and are placed in service before the expiration of the solar ITC in 2016 are eligible under the program.

It is important to note that under the 1603 program, the government does not pick winners and losers – it simply allows taxpayers to receive a federal grant in lieu of taking an existing energy tax credit they are otherwise entitled to claim. This merely constitutes a change to the timing of when an existing energy tax incentive can be utilized. This change in timing, however, provides the liquidity needed for the further development of domestic energy projects.

Section 1603 Treasury Program Has Been a Proven Success

1603 is structured in a technology neutral manner that encourages the development of a wide variety of domestic energy technologies including: biomass; combined heat and power; fuel cells; geothermal; hydropower; landfill gas; marine hydrokinetic; microturbine; municipal solid waste; wind and solar.

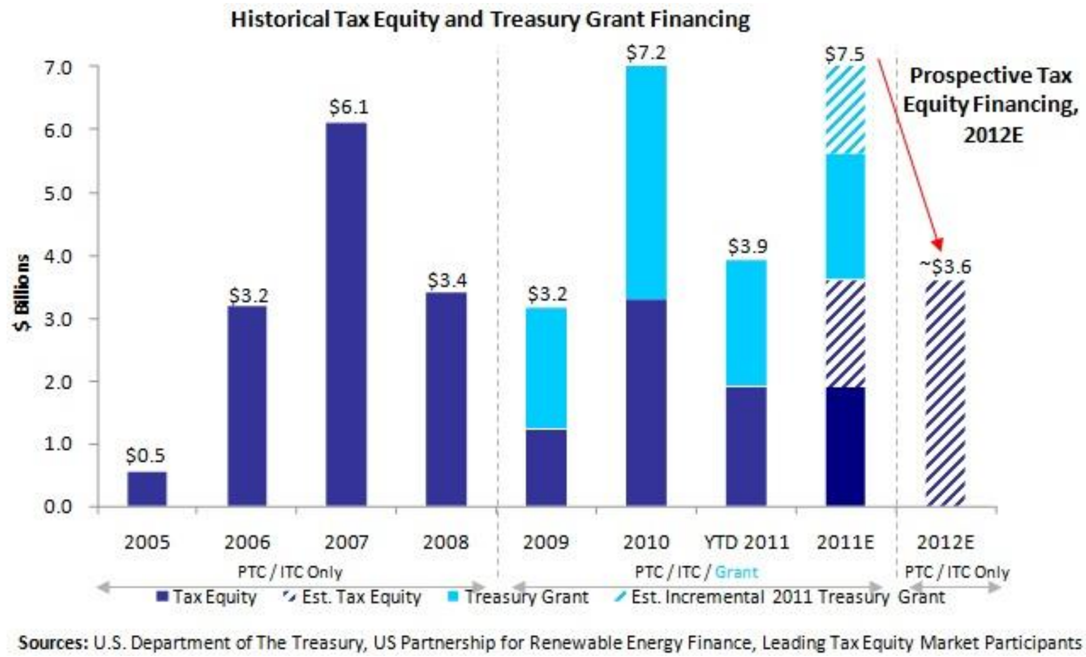
Since its enactment, the National Renewable Energy Laboratory's ("NREL") preliminary analysis conservatively estimates that 1603 has supported an average of 52,000 to 75,000 jobs over the period analyzed. The program has leveraged $25.8 billion in private sector investment to support over 24,000 domestic projects utilizing a wide range of energy technologies in all 50 states. As of March 2012, awards to more than 22,000 domestic solar projects leveraged over $4.87 billion in private sector investment for projects in 47 states.

It is important to note that 1603 is particularly helpful for small businesses that are the nation's engine of economic growth and job creation. These businesses typically do not have the resources or scale to enter into complicated tax equity financing transactions. By virtue of its structure, 1603 allows small solar businesses and project developers to monetize the underlying solar ITC to finance the development of worthwhile distributed generation projects. The fact that the average 1603 award for a solar project is less than $150,000 demonstrates that small businesses are effectively utilizing the program.

Congress Should Extend the Section 1603 Program

Though the tax equity market has modestly improved, there remains a need for 1603. Access to tax equity financing has still not recovered to the levels available prior to the recession, and the rates of return that are being demanded in today's marketplace by investors remain prohibitively high. In December 2011, tax equity investors in solar projects required returns from 7.5% to as high as 17% compared to pre-recession levels of 6% to the low teens.

Due to global economic conditions, a large gap persists between the total amount of financing that renewable energy developers need to fully realize the benefits of continued expansion of domestic solar projects. Expiration of 1603 is projected to reduce the availability of tax equity financing from an estimated $7.5 billion in 2011 to approximately $3.6 billion in 2012 – a reduction of more than 50%. This will stifle job creation and severely restrict the market's ability to leverage private sector capital to finance new domestic energy projects. Therefore, to continue this successful, job-creating program, SEIA encourages Congress to extend 1603.



Conclusion

As the brief duration of federal solar tax incentives demonstrates, effective federal tax policy can yield significant energy and economic policy benefits. SEIA and the U.S. solar industry look forward to working constructively with policymakers to craft effective tax policy that is consistent with the nation's energy and economic policy objectives.

Again, Chairman Broun, Chairman Harris, Ranking Member Tonko, Ranking Member Miller and members of the subcommittees, I sincerely appreciate having the opportunity to testify today, and would be happy to answer any questions you might have.